

## Claims

- [c1] 1.A method for planning minimally invasive direct coronary artery bypass (MIDCAB) for a patient, the method comprising:
  - obtaining acquisition data from a medical imaging system;
  - generating a 3D model of the coronary arteries and one or more cardiac chambers of interest of the patient;
  - identifying one or more anatomical landmarks on said 3D model;
  - registering saved views of said 3D model on an interventional system; and
  - visualizing one or more of said registered saved views with said interventional system.
- [c2] 2.The method of claim 1, further comprising identifying, from said 3D model, orientation, size and dimensions of the coronaries and ventricles.
- [c3] 3.The method of claim 1, wherein said obtaining acquisition data is implemented with protocols directed for imaging the coronary arteries and ventricles.
- [c4] 4.The method of claim 3, further comprising utilizing

post processing software to process said acquisition data so as to generate interior views of the coronary arteries and ventricles.

- [c5] 5.The method of claim 4, wherein said 3D model and said interior views are visualized through a display screen associated with said interventional system.
- [c6] 6.The method of claim 1, further comprising registering MIDCAB instruments on said interventional system.
- [c7] 7.The method of claim 1, further comprising measuring size, extent and number of lesions in the coronary arteries needing MIDCAB.
- [c8] 8.The method of claim 1, wherein said obtaining acquisition data is EKG gated.
- [c9] 9. A method for planning minimally invasive direct coronary artery bypass (MIDCAB) for a patient, the method comprising:
  - obtaining acquisition data from a medical imaging system using a protocol directed toward the coronary arteries and left ventricle;
  - segmenting said acquisition data using a 3D protocol so as to visualize the coronary arteries and the left ventricle;
  - generating a 3D model of the coronary arteries and the

left ventricle of the patient;  
identifying one or more anatomical landmarks on said  
3D model;  
registering saved views of said 3D model on an interven-  
tional system;  
visualizing one or more of said registered saved views  
with said interventional system; and  
identifying, from said 3D model, orientation and any  
anomalies associated with the coronary arteries and the  
left ventricle.

- [c10] 10.The method of claim 9, further comprising utilizing post processing software to process said acquisition data so as to generate interior views of the coronary arteries and ventricles.
- [c11] 11.The method of claim 10, wherein said 3D model and said interior views are visualized through a display screen associated with said interventional system.
- [c12] 12.The method of claim 9, wherein said obtaining acqui-  
sition data is EKG gated.
- [c13] 13.The method of claim 9, further comprising registering MIDCAB instruments on said interventional system.
- [c14] 14.The method of claim 9, further comprising measuring size, extent and number of lesions in the coronary arter-

ies needing MIDCAB.

- [c15] 15.The method of claim 9, wherein said medical imaging system is one of a computed tomography system, a magnetic resonance imaging system and an ultrasound system.
- [c16] 16.A method for planning minimally invasive direct coronary artery bypass (MIDCAB) for a patient, the method comprising:
  - obtaining acquisition data from a cardiac computed tomography (CT) imaging system using a protocol directed toward the coronary arteries and left ventricle;
  - segmenting said acquisition data using a 3D protocol so as to visualize the coronary arteries and left ventricle, including interior views of the coronary arteries;
  - generating a 3D model of the coronary arteries and left ventricle of the patient;
  - identifying one or more anatomical landmarks on said 3D model;
  - registering saved views of said 3D model on a fluoroscopy system; and
  - visualizing one or more of said registered saved views with said fluoroscopy system; and
  - identifying, from said 3D model, orientation and any anomalies associated with the coronary arteries and the left ventricle.

- [c17] 17.The method of claim 16, further comprising utilizing post processing software to process said acquisition data so as to interior views of the coronary arteries and ventricles.
- [c18] 18.The method of claim 17, wherein said 3D model and said immersible views are visualized through a display screen associated with said fluoroscopy system.
- [c19] 19.The method of claim 16, wherein said obtaining acquisition data is EKG gated.
- [c20] 20.The method of claim 16, further comprising registering MIDCAB instruments on said interventional system.
- [c21] 21.The method of claim 20, further comprising measuring size, extent and number of lesions in the coronary arteries needing MIDCAB.
- [c22] 22.A system for planning minimally invasive direct coronary artery bypass (MIDCAB) for a patient, comprising:
  - a medical imaging system for generating acquisition data;
  - an image generation subsystem for receiving said acquisition data and generating one or more images of the coronary arteries and the left ventricle of the patient;
  - an operator console for identifying one or more anatom-

ical landmarks on said one or more images; a workstation including post processing software for registering saved views of said 3D model on an interventional system; and wherein said interventional system is configured for visualizing one or more of said registered saved views therewith, quantifying distance and location information for a cardiac point of interest, and identifying an incision location and path for MIDCAB based on said quantified distance and location information for said cardiac point of interest.

- [c23] 23. The system of claim 22, wherein said image generation subsystem is configured with protocols directed for imaging the coronary arteries and ventricles.
- [c24] 24. The system of claim 23, wherein said post processing software is further configured to process said acquisition data so as to generate interior views of the coronary arteries and ventricles.
- [c25] 25. The system of claim 24, further comprising a display screen associated with said interventional system, said display screen for visualizing said 3D model and said interior views.
- [c26] 26. The system of claim 22, wherein said interventional

system is configured for registering MIDCAB instruments therewith.

- [c27] 27. The system of claim 22, wherein said image generating subsystem is EKG gated.